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automated attendant, directory service, and interactive voice response.

Voice response vendors are almost as diverse as the systems themselves. Besides manufacturers, which sell directly and thorough distributors, the voice response market consists of value-added resellers (VARs) and system integrators. The leading VARs are Dialogue and Hagar Communications. Leading system manufacturers are:

Perception Technology

Periphonics

Syntellect

AT&T Conversant Systems

Invervoice

Component manufacturers are also an important player in the voice response market. These companies market their product to OEMs, VARs and system integrators. Component manufacturers include:

Dialogic

Innovative Technologies

Natural Microsystems

Electronic Mail vendors are segmented by type of system offered. Mainframe, Minicomputer and Dedicated System - the three most influential vendors in the office computing market lead the E-mail market in the large system environment:

IBM

Hewlett-Packard

DEC

Microcomputer/LAN-Based System - some of the leading vendors are:

Action Technology

Sitka

CC Mail

Softswitch

CE Software

3Com Corp.

Consumers Software Inc.

DaVinci System

Microsoft

Retix

Telecommunications Study:
MBE Opportunities

F. Sources of Information

Gartner Group Consulting Firm, proprietary research services and primary research.

III. MARKET STRATEGY

A. Modes of Entry

The market is well established from the standpoint of major players. In addition, the cost of becoming a major player is very high for R & D, manufacturing, marketing, sales, distribution, and service. There is, however, opportunity for lower-cost market entry in several areas:

1. Developing system components. Voice processing boards can be developed which provide functionality as an adjunct to an existing telephone system.
2. Local distributor. A firm with marketing ability can gain access to the small business market and/or provide sales and service support for a manufacturer.
3. Application development. At a system level and at the application level, the ability to provide functional software will "always" be a major opportunity.
4. User support. Most new voice processing and electronic mail users require expert support in key functions:
 - Design
 - Planning
 - Implementation
 - User training
 - System monitoring
 - Systems analysis
5. In addition to the end-user as an area of opportunity, the local telephone company is an opportunity for third party enterprises. Voice processing and electronic messaging are considered subsets of the advanced intelligent network (AIN), the telephone industry's effort to bring greater intelligence to the public switched network. The AIN is taking shape as adjunct processors and applications software provide more power and end-user features to the switching systems that make up the public switched network.

Telecommunications Study:
MBE Opportunities

Switch manufacturers have been slow to provide the features the local telephone companies and long distance carriers require to take advantage of these new revenue streams. As a result, attached to the local and long distance switching systems are voice processing and electronic messaging processing systems as well as computers. Computer manufacturers have also been slow to develop the sophisticated voice processing and electronic messaging systems needed in the telephone market as well as in the commercial market. This slowness provides another opportunity for third parties with specialized skills to solve an industry need.

6. The final opportunity is the service bureau. Businesses that can not cost justify internal systems can utilize a service bureau for voice mail and E-mail applications. A service bureau is analogous to a rental mailbox service. For a monthly fee, plus a charge per message unit, voice messaging and electronic mail technology can be made available with most of the features of a stand-alone system without the initial capital investment. This is very attractive to the small business. A local entrepreneur can establish a service for the small, local business community.

B. Timing Considerations

The messaging market will continue to gain acceptance in the business community and the home market. The basic drivers will be:

Increased system functionality

Reduction in price per function

Centralization of the applications - the telephone company or a service bureau.

A minimal number of constraints - standards will be established for system integration.

Messaging will grow beyond the function we see today and will include:

Interactive voice recognition and voice synthesis

Facsimile service

Transaction processing

Inter-corporate services

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The products, systems, and applications should become significantly easier for the end user to use. The ability to permit the end user to customize the product to meet specific requirements will become a more available capability. The needs of the customer are well understood by the suppliers and the products are designed with the flexibility to meet these needs. Product trends will initially be to decrease the price while maintaining constant product functionality and then reach a stage of constraint cost with an increase in functionality. This increase in functionality will include the incorporation of multiple messaging, mail and transaction functions within a single, integrated architecture and the utilization of multiple technologies.

Two distinct markets for voice processing, messaging and mail products, services, and applications will evolve. One market that is geared to the medium and large business enterprise can afford and totally justify internal systems. The second market is the small business and residence market. The residence market being further divided into consumers and professionals who work at home. Here, the ability to afford and justify systems is more limited.

The larger corporate entities will drive toward the more sophisticated, integrated messaging system. They will be developing systems that are highly interactive with applications, internal and external databases, and provide connectivity to outside business partners. These systems will begin to evolve in the 1993-1995 time frame. The larger business and (selected) resident market will rely on low cost stand-alone systems, telephone company services, service bureaus, or connection to a corporate system.

The major opportunity for third party businesses is in the small business and resident market. This market is beginning to evolve at this time and should have increased growth over the next 3 to 4 years.

C. Cost of Entry

In each of these areas, the major costs of entry are:

1. Becoming knowledgeable in messaging systems
2. Obtaining a relationship with a manufacturer
3. Developing a marketing program

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D. Critical Factors for Success

Success in the messaging market will be driven by the degree of innovation, application development, price, and market presence. The degree of innovation will be the ability for market participants to address some of the key issues of users of messaging systems.

- What information needs to be given and what transactions need to be processed by the system?
- How easily can the system be expanded?
- What are the features, functions, and ease-of-use of the application generator and script development tools?
- What is the speech quality of the voice system?
- How easy is it to interconnect systems, users, and applications?
- What is the volume of actual and anticipated calls and messages?
- What is the reliability of the system and service?
- What standard report and statistics are available and what administrative and operational feedback is provided?

Applications development and technology enhancements will also be a primary factor for success by vendors. Future market direction and success will revolve around the following trends and requirements:

- Common product platforms combining voice response, voice mail, automated attendant, text, and fax.
- Speech recognition as an input.
- Applications that use automatic number identification to access host computer databases.
- Support for ISDN facilities.
- Interconnectivity among different vendor products.
- Increased applications, integration PBX, ACD and computer database systems.

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- System and user directory.
- User-friendly interfaces.

Market presence is a factor for all system manufacturers. They have not only developed direct channels, but have also developed key relationships with local telephone companies, distributors, VARs, and systems integrators. As the market moves to smaller users, the need for local distributors will increase.

IV. OPPORTUNITIES FOR MBES

The technological advances in voice processing and electronic mail provide a number of opportunities for MBES both in developing and offering these type of services to corporate end users and in partnering with existing providers of messaging products and services. High tech MBES currently providing computer and telecommunications services are well positioned to take advantage of these application opportunities, particularly in the area of voice processing, through the development of customized application software and integration of hardware and systems. Additional low cost entry areas include system design, sales, service, and end user training. As the use of messaging services spreads into the small business and professional market additional opportunities will arise.

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MBE Opportunities

MARKET SEGMENT ANALYSIS

CABLE TELEVISION

I. MARKET DEFINITION

A cable system is a pay television delivery system that provides from 12 to more than 125 channels of video programming through coaxial or optical fiber cable to multiple subscribers in a community. Cable television distribution systems consist of four parts: (1) headend - facility for receiving, and converting signals for redistribution; (2) trunk lines which carry the signal from headend to; (3) feeder lines which branch to local neighborhoods; and (4) drop lines which drop from the feeder directly into a subscriber's home.

The cable industry as we know it today is approximately 15 years old. Major growth for the industry came between 1980 and 1988 with the introduction of "basic service" and narrowcasting (channels devoted to a specific type of programming). Prior to that time, cable was used for improved television reception. In the early 70's, Home Box Office introduced pay television which is premium program services for which subscribers pay fees over and above the cost of the monthly basic subscription fee. Today, consumers subscribe to cable for video programming which is an adjunct to "free" over the air television. However, there are numerous other commercial uses for cable as a delivery system that have been developed but have only been deployed on a limited basis:

- Interactive video service, to allow for ordering pay per-view, home shopping, educational responses
- Instructional interactive networks
- Interactive municipal services such as:
 - police & fire department communications
 - county jail & courthouse communications
 - traffic light control
- Home security alarm systems
- Home energy management
- Opinion polling
- CNBC/FNN offers MarketWatch which allows personal computers

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to receive financial information and stock quotes via coaxial cable versus telecommunications lines and a modem

- Voice telephone in the future (Cablevision System, Continental, and Cox Cable have FCC approval to experiment with Personal Communications Services (PCS) technology specifically in New York City, Boston, Chicago, and Cleveland until 1/1/93.)

II. MARKET ENVIRONMENT

A. Current Status of the Market

There are 10,823 cable systems in the U.S. serving approximately 28,000 communities. The largest system is Cablevision Systems in Oyster Bay, N.Y. with 400,000 subscribers. Tele-Communications Inc. (TCI) is the largest multiple system operator (MSO) with over 11 million subscribers. According to Broadcasting, an industry magazine, there are 53,900,000 cable subscribers or 58.6% of the nation's television households are hooked-up to cable television systems.

Beginning in the late 1970's current cable operators were awarded city and area franchises by municipal governments with franchises running from 15 to 20 years. Some of them are now up for renewal.

B. Sizing

The actual size of the cable market varies by industry source based on the types of services that are included in cable statistics. Some sources include private cable and wireless cable systems in determining the number of subscribers and revenues. The following statistics are from three well known media sources:

Paul Kagen Associates, a leading consulting firm on the cable industry, August 1990

Total US TV Households - 91,533,000
Percent Subscribing to cable - 56%
Percent of TV Households that have access to cable - 92%
Total Revenue - 1989 \$15,933,000,000

Broadcasting 3/11/91

Total US TV Households - 92,100,000
Total Subscribers - 53,900,000
Homes passed by cable lines - 71,300,000
Total Cable Systems - 10,823,000
Percent subscribing to cable - 58.6%

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Standard and Poor's Industry Survey April 19, 1990
1989 Revenue \$18,881,000,000 (up 18% over 1988)
1990 Est. Revenue \$21,393,000,000 (up 14%)
4.2% expected increase in basic subscribers

The rapid growth of subscribers in the past will not continue into the future. Based on a forecast by Veronis, Suhler & Associates Inc., an investment banking firm, over the five year period, 1989-1994, annual cable subscription spending will grow at a compound annual rate of 7.2% which is almost 4% less than the growth rate for the previous 5 years. Cable penetration will slow to a 2% increase in homes passed (local area wired for cable) compared to 15.4% over the last 5 years. The growth in subscribers over the five year period will slow to 5% compared to 15% growth over the previous 5 years.

Cable penetration will not increase beyond 60% even though more than 90% of U.S. television households are passed, therefore, any growth will come from existing subscribers. However, advertising revenues will continue to increase with a 13.7% compound annual growth by 1994 to \$3 billion although the growth rate is lower than experienced previously.

Multiple System Operators (MSOs) are projecting subscriber growth of 4-5% in basic services for 1991 and flat growth for pay services which was the 1990 experience. Pay services are competing against home videos and basic cable. Most have yet to justify their higher costs to subscribers.

C. Constraints

1. Regulatory

Cable television is regulated by state and local governments, and the FCC. Municipal authorities are responsible for issuing franchises, writing customer service requirements, setting renewal requirements, setting standards, imposing fees, and requiring that cable companies provide free channels to schools, the public and the government. The FCC imposes technical standards, channel use requirements, and fairness requirements. The federal Cable Communications Policy Act of 1984 set limits of state and local regulation and deregulated rates. Anyone offering cable service before July 1, 1984 does not require a franchise.

2. Legislative

Increasing rates for service and service problems have caused Congress to threaten re-regulation. Industry watchers are expecting

Telecommunications Study:
MBE Opportunities

a bill this year (1991). A bill was drafted last year but stalled in Congress. The Bush administration and the FCC are pushing to increase competition instead of regulation by encouraging alternative services like wireless cable and Direct Broadcast Satellite (DBS).

If Congress passes legislation it will likely address the following:

- a. Re-regulation of rates for either basic service or some tier level
- b. Imposition of service standards to cover signal quality and response time for service requests
- c. Access to cable programming for alternative, competitive technologies.

The FCC is trying to approach re-regulation from the stand point of defining effective competition so that market forces will "police" cable. Proposed FCC tests for effective competition include the presence of 6 unduplicated TV signals, the availability of alternative services such as satellite or wireless cable, and whether a cable operator is behaving as if he has competition by pricing and providing service appropriately.

There is also some dissension between cable system operators and broadcasters regarding the "must carry" provision. The area of dissension involves whether or not cable operators should continue to offer over-the-air TV channels and on what channel numbers. Congress would like the two industries to reach an agreement without congressional intervention. Current proposals include having cable operators pay broadcasters for carrying their signals.

3. Technological

Construction and maintenance costs are high as cable companies continue to upgrade systems by investing in fiber optics to improve and increase the number of channels available. Additional technology upgrades involve system addressability (whether the home convertor can be programmed from a central cable site or if the cable company must send an employee out to the subscriber home to make changes) and interdiction (moving the convertor box outside of the home to create clean signals that will allow consumers to buy cable ready television sets.)

Telecommunications Study:
MBE Opportunities

D. Geography/International Issues

Major cable operators have an interest in expanding overseas. Europe and Japan have not been heavy cable subscribers in the past. U.S. companies have begun submitting proposals for cable franchises in Great Britain. Currently 5 out of 7 RBOC's and 6 of the top MSOs have been awarded franchises.

E. Players - Competition

The top 63 cable companies have 85% of all cable subscribers as customers. The top 10 cable MSOs are:

FIRM NAME	SUBSCRIBERS
TCI (Tele-Communications Inc.)	8,860,995
Time Warner	6,236,100
UA Entertainment	2,681,000
Continental Cablevision Inc.	2,671,000
Comcast Cable Communications	1,604,000
Cox Cable Communications	1,571,200
Storer Communications Cable Division	1,564,000
Cablevision Systems Corporation	1,502,600
Jones Spacelink Ltd.	1,455,100
Newhouse Broadcasting	1,219,600

Technologies which compete with cable include VCR's, movies, off-the-air TV broadcasting, wireless cable and Direct Broadcast Satellite (DBS). However, cable is expected to continue to be the dominant multichannel video distribution service for some time. Advances in fiber and compression technology will allow for cost-efficient upgrade, improved picture quality, and increased channel capacity. This should give cable a strong competitive edge against DBS systems and the future entry of telephone companies.

Direct Broadcast Satellite (DBS) is a high-powered satellite system that operates the same way as cable satellites. A DBS transmits several signals directly to the home for pickup by way of a small dish antenna. DBS was authorized by the FCC in 1982 and to date, there are no commercial systems in operation. Disadvantages of DBS relative to cable include:

- Inability to broadcast local programs like news and sports (often referred to as localism)
- Requirement for every consumer TV to have a receiver
- Non-interactive service

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MBE Opportunities

■ Piracy of signals

Cable operators are very concerned about the entry of local telephone companies into their business. Telephone companies are allowed to own cable systems that do not reside in the same area where they provide telephone service, except for some very particular rural exceptions. The cable operators would like the telephone companies to act as conduits and not as providers of programming. Cable operator concern revolves around telephone company financial resources, and ability to dominate both broadcasting and cable if allowed to fully compete in the cable industry.

F. Sources of Information

Associations and Experts

Cable Television Administration and Marketing Society
Margaret C. Durborow, President

(CATA) Community Antenna Television Association
Stephen R. Effros, President
James H. Ewalt, Exec. V.P.
Rob Stoddard, V.P. Communications

(NCTA) National Cable Television Association
James Mooney, President

Paul Kagen Associates

Sources of Information

Broadcast Yearbook 1990

Broadcasting. 15, 22 January; 26 February; 14, 21 May; 18, 25 June; 23, 30, July; 6 August 1990; January - March 1991.

"Cable Television Developments" (Washington, D.C.: National Cable Television Association Research and Policy Analysis Department, October 1990).

Cable TV Franchising, 30 November 1990, 7; 25 February 1991.

"GAO says Basic Cable Rates Up 10% in 1989". Broadcasting, 18 June 1990, 23.

Klein, Dr. Benjamin, Phd. "The Competitive Consequences of Vertical Integration in the Cable Industry" (University

Telecommunications Study:
MBE Opportunities

of California, Los Angeles, 1989).

Landro, Laura. "Despite a Robust Basic Business, Picture is Flawed for Cable TV". Wall Street Journal, 21 March 1991.

"MSO's See More of the Same for Pay, Basic". Broadcasting, 6 December 1990, 41.

Newsletters from the Community Antenna Television Association

"Personal Computing Service". Broadcasting, 17 December 1990, 73.

Standard and Poor's Industry Survey "Media Current Analysis" 19 April 1990.

"The Future of Television" (Washington, D.C.: National Cable Television Association Research and Policy Analysis Department, May 1990).

"Things Are Looking Up for Network Advertising". Broadcasting, 23 July 1990, 66.

"Western Cable Show: Fiber is Cable's Edge in Competitive World". Broadcasting, 3 December 1990, 39.

III. MARKET STRATEGY

A. Modes of Entry

1. A new cable system operator can obtain a franchise from a franchising authority (municipal or local government) to construct and operate a cable system. A franchising authority may award any number of franchises per geographical jurisdiction. Most franchising authorities have awarded their franchises, although it is conceivable that they could award more; they are not prevented legally from doing so (eg. San Diego). Some cities are awarding "overbuilds" which allow a new cable company to provide service to an area passed over by the original franchisee.
2. A cable system can be acquired. Since 1985 54% of the cable systems surveyed by GAO (which represented 86% of all subscribers) have changed hands. Current financing has been somewhat limited with the decline in junk bond financing and the uncertainties regarding cable re-regulation. In addition, many cable companies are highly leveraged (having taken on debt during the 80's to expand and upgrade systems and provide

Telecommunications Study:
MBE Opportunities

additional programming) which tends to make them less attractive for purchase.

B. Timing Considerations

The cable industry is entering its mature phase with growth coming at a slower rate based on existing subscribers signing up for more channels and more programming. However, cable is positioned to expand into other areas (see MARKET DEFINITION) and there have been some outgrowths from the cable technology (see Opportunities for MBES).

C. Cost of Entry

The most common mode of entry is through acquisition of an existing system or franchise. The average rate per subscriber was approximately \$2000 for cable systems purchased in 1989. That rate will decline due to lack of available financing. According to a recent Wall Street Journal article, the Providence Journal Co. acquired a cable system from King Broadcasting and paid \$1500 per subscriber.

If it is possible to obtain a franchise and build a system, the cost of laying cable ranges from \$10,000 per mile in rural areas to \$100,000 in urban areas and up to \$300,000 where underground cable is required.

D. Critical Factors for Success

1. On-going financing for system upgrade. Technological advancements warrant upgrade to fiber optics for increased channels and addressable convertors to contain maintenance and customer service costs. Time-Warner just announced a 150 channel upgrade to their existing cable system through the use of fiber optics and coaxial cable.
2. Access to quality programming. Costs are rising.
3. Resolution of legislation uncertainties.

IV. OPPORTUNITIES FOR MBES

Acquisition of existing systems is the most cost effective way to become a cable system operator. MBES with strong financial and operational resources can own and operate cable systems. The most recent acquisitions by MBE owners involved skillful use of the FCC minority tax certificate policy and creative use of financing.

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MBE Opportunities

At a lower cost of entry, the growth of cable and various cable networks has created opportunity in the area of video transmission services. Teleports and remote uplinking equipment (mobile satellite transceivers) are in demand for network origination and sporting events. (The latter is particularly true in areas where major colleges and universities are located.)

New technology has created an opportunity in the area of cable radio. There are three companies marketing digital audio services. This is commercial free, narrow format music which is transmitted to a subscribers home via unused cable trunk space. A wire attaches from the cable box to household tuner. The headend cost (system facility which will amplify and transmit) is about \$18,000 and the cost per subscriber is \$80 for a special tuner. Companies have to negotiate with existing cable operators for unused trunk space.

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MBE Opportunities

MARKET SEGMENT ANALYSIS

WIRELESS CABLE

I. MARKET DEFINITION

Wireless Cable or MMDS (Multichannel Multipoint Distribution Service, also referred to as MDS) is a microwave pay TV system. MMDS receives scrambled satellite channels (HBO or MTV), as well as over the air broadcast signals, and uses omnidirectional microwave radio channels to transmit video to subscribers who are equipped with special antennas to receive and decode the signals. The subscriber's leased antenna receives the microwave frequencies (which a conventional TV antenna cannot), converts them to lower frequencies which are then fed to a standard TV, and viewed on an unused VHF channel (2-13). MMDS is line of sight transmission (the receiving antenna has to have an unobstructed view of the transmitting antenna.) Unlike conventional cable TV, there is no ground cable to be laid and consequently wireless cable has lower construction costs and faster turn around time for new subscribers.

Wireless cable provides current cable customers or prospects with a competitive alternative to conventional cable service. It also provides cable and pay television to areas currently unserved by cable. Unserved areas may be rural or high density urban areas where the cost of cable installation is prohibitive. MMDS operators can offer a basic package (15 cable stations, one pay service, and nine off-the-air channels) for about \$20 per month versus average cable rates of \$30 per month. Because of the type of technology involved, wireless cable generally has few system outages, compared to coaxial cable services, and picture quality can be superior. (See Geographical Issues)

II. MARKET ENVIRONMENT

A. Current Status of Market

MMDS systems have been around since the early 1970's when they consisted of one channel. The FCC increased the number of channels available in the mid-1980s and thus created multichannel MMDS systems. While the service can be used to transmit video, data, or text, most systems provide video entertainment with some operators leasing most of their channel time to pay-movie entrepreneurs who provide programming to hotels, apartment buildings and homes.

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Today wireless cable operators have tended to construct and market their services in areas unserved by cable. They have generally not competed against cable directly. This will change in the future as the number of unserved cable areas declines and as more wireless cable systems become economic successes.

B. Sizing

Wireless cable is a relatively new commercial service and current estimates of subscribers are between 200,000 to 350,000. It has the potential to penetrate 20-25% of all American television households.

According to Paul Kagen Associates, a leading industry consulting firm, (August 31, 1990):

- 56% of all television households have basic cable
- 36% of all television households have access to cable but don't subscribe
- 8% do not have access

The market for wireless cable includes households that do not have access to cable, households that have access but do not subscribe, and cannibalization from existing cable subscribers. Households not having access to cable or not subscribing to cable may have a satellite dish or live in apartments with a Satellite Master Antenna System (SMATV) for wireless cable reception.

C. Constraints

There is no local regulation of wireless cable (unlike conventional cable which must have a franchise from a local governing authority) but operators must obtain a license from the FCC. Depending on mode of entry, a wireless cable system operator may or may not be regulated as a common carrier. If regulated as a common carrier a tariff must be filed for rates that will be charged.

FCC policy limits the number of possible channels that an MMDS system can have to 33. An operator must have access to at least 20 channels for the service to be a viable alternative to cable. The FCC has assigned MMDS eight channels, MDS two channels, and operators can lease additional channels from ITFS (Instructional Television Fixed Service) licensees who have 20 channels, and Optional-Fixed Microwave Service (OFS) licenses with three channels. The 20 ITFS channels are not available full time (but are available late afternoons, evenings, and weekends) as they must be used for educational programming for at least 20 hours per week.

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While MMDS has the capacity for 33 channels, it isn't likely that all 33 channels would be available in one market. Leasing of channels can be cumbersome as an operator must negotiate with the different channel licensees; each group is handled by a different department within the FCC. The FCC has tried to streamline the process of applying for a license in an attempt to encourage wireless cable development. Once an application is submitted to the FCC, it goes on public notice allowing anyone else to apply, although the FCC has provided for a 1 day filing window in each community to reduce the number of applications. Even so, according to attorneys at the law firm of Reed Smith Shaw & McClay, the FCC is currently wrestling with 21,000 applications. Because of the questions on the license application and the complexities of the process, an entrepreneur requires help from a lawyer and communications engineer to complete the application.

There are physical constraints to wireless cable systems. The average range of a transmitting site is 20-25 miles or 1200-2000 square miles. In areas of high foliage, the range is limited to 10 miles or 300 square miles. "MMDS operates best in suburban areas characterized by a flat topography with sufficient population density to support either transmission towers or tall buildings on which the MMDS transmitter can be placed. The West, Southwest and Midwest probably have the best combination of terrain and vegetation. However, the density of large metropolitan areas, such as New York City, can offset the lost coverage resulting from line of sight problems."¹ A new commercial product has been developed called a "beam bender" which provides some relief from the physical aspects and allows the transmitted signal to go around certain physical obstacles like trees, buildings or hills. Analysis of where the transmitter should be placed to minimize physical obstacles needs to be done by an engineer.

Access to programming can be a constraint as many of the larger cable operators have partial ownership in cable programming services and do not wish to supply wireless cable with programming. However, this situation seems to be changing as most programmers would like the widest distribution they can get. The FCC is recommending legislation to discourage unreasonable refusals to sell programming to wireless cable operators.

¹Liu, Beatrice, "MMDS (Wireless Cable) and Its Potential Impact on Cable Television", 28 March 1990.

Telecommunications Study:
MBE Opportunities

D. Geographical/International Issues

Under certain circumstances, wireless cable may provide a clearer picture than standard cable systems. Cable signals carried by coaxial cable lose power the further they travel from the cable headend, the facility that receives and converts signals for distribution. Amplifiers are needed at regular intervals to boost the signal, but they can also introduce distortion which degrades the signal. This is not true of wireless cable if it has direct line of sight. In finding a viable market a wireless cable system must not be within 50 miles of any other proposed or operating wireless system.

E. Players - Competition

There are no major players within wireless cable. It is strictly an entrepreneurial business at this time. The Wireless Cable Association (WCA) conducted a survey in 1990 and identified 62 systems that were either operating or would be operating by the beginning of 1991. However, there are some large partners waiting in the wings. Graphic Scanning is a partner in a 26-channel system beginning operation in Sacramento by Pacific West. It is also possible for cable companies to become wireless cable operators outside of their own local franchise area.

Wireless cable competes against anyone providing video entertainment including cable TV, broadcasting TV, DBS, VCRs and, possibly in the future, the local telephone company.

The major threat today is Direct Broadcast Satellite (DBS) which will provide direct to-the-home TV broadcasting via satellite. Subscribers must have an antenna and a small dish to receive DBS service. According to Satellite Business News, there are 2.6 million households with home dishes. The physical constraints that apply to wireless cable are not a problem for DBS. DBS is expected to have greater channel capacity than current cable offerings. DBS seems more viable than wireless cable because major cable players have invested in it. However, there are no commercially available DBS systems today. TeleCommunications Inc. (TCI), the largest cable operator, and Time Warner have invested in a DBS system called K Prime to be launched sometime in 1991. It will have 10 channels to start. Cablevision Systems, NBC and NewsCorp (parent of Fox Broadcasting) invested \$75 million each, along with Hughes Communication which invested \$400 million, in a DBS system called Sky Cable which is to have 108 channels. Recently, News Corp, Cablevision, and NBC pulled out of the consortium and Hughes is looking for new partners.

Telecommunications Study:
MBE Opportunities

Sometime in 1992, digitization should be available for cable and wireless cable which will allow 10 or more video signals to be squeezed into bandwidths that today only carry one signal. This would increase the channel capacity and provide for even more entertainment channels and services transmitted to subscribers.

F. Sources of Information

ASSOCIATIONS AND EXPERTS

(WCA) Wireless Cable Association, Robert Schmidt, President.

Beatrice Liu of Gerard Klauer Mattison & Co, an investment firm.

Samuel Book of Marlarkey-Taylor Research

Paul Kagen Associates

William Parrott, President of Private Networks (identified MBE).

Ted Tarver, President of Communications-Link Inc. of Houston, which designs and implements wireless cable systems.

SOURCES OF INFORMATION

Amons, Richard, Wireless Cable owner. Phone interview 5 March 1991, Washington, D.C.

Baxter, Frank C. "MMDS: Technical Primer". Cable Television Business, 15 October 1988, 38.

King, Thomas R. "Slump Leads Pay TV to Fight Frill Image". Wall Street Journal, 7 February 1991, (B)1.

Landro, Laura. "Despite Robust Basic Business, Picture is Flawed for Cable TV". Wall Street Journal, 21 March 1991.

Liu, Beatrice. "MMDS (Wireless Cable) And Its Potential Impact On Cable Television." New York: Gerard Klauer Mattison & Co. 28 March 1990.

Meeks, Fleming. "The Wireless Wonder". Forbes, 19 February 1990, 57.

"Multipoint Distribution Service", Washington, D.C.: FCC Consumer Assistance & Small Business Division, Office of

Telecommunications Study:
MBE Opportunities

Public Affairs, February 1989.

Private Cable 9 (July 1990).

Sherman, Wayne L. "If MMDS Comes To Your Town". Cable Television Business, 1 November 1988, 32.

Steinberg, Jim. "Wireless TV Takes Aim At Area Market". Corpus Christi Caller Times, 5 April 1990.

"Telecommunications Opportunities in the '90s." Washington, D.C.; seminar sponsored by Reed Smith Shaw & McClay Law Firm, 13 March 1991.

"Wireless Cable Believes Its Day Has Come". Broadcasting, 30 July 1990, 70.

III. MARKET STRATEGY

A. Modes of Entry

The FCC is publicly encouraging wireless cable as a technology and industry so that it becomes a viable competitor to conventional cable.

A licensee can operate as a common carrier by leasing transmission time to non-affiliated programmers or operate as a non-common carrier programming their own facility or leasing time to an affiliated programmer. Operators electing common carrier status are subject to common carrier rules and must file a tariff to cover their rates.

The FCC grants preference for minority operators when applying for a license. All licensees are subject to the same deadlines. Facilities must be constructed and ready to operate within 12 months of receiving the license. The application filing fee is \$155. Once a system is constructed, the operator must pay a license fee of \$455 per channel.

B. Timing Considerations

The FCC re-opened the MMDS filing period in 1988 and is continuing to accept applications. Some trade publications suggest that the window of opportunity is from the present through to the next 2 to 5 years. This time frame is based on the possible entry of DBS (see Players). Others see a 5-year window and don't expect DBS to

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MBE Opportunities

really take off until 1995. The major consideration for any entrepreneur is to be able to identify a market and build a system before conventional cable is able to address certain geographically remote areas where it is too cost-prohibitive to lay ground cable. Technological developments bring the conventional cable subscriber installation cost down every day.

C. Cost of Entry

The Wireless Cable Association (WCA) estimates the cost of construction for a new wireless cable system to be between \$1 million and \$4 million (50% that of conventional cable) depending on the size and number of channels. Per subscriber costs would average \$500 to \$600 (versus \$1,100 to \$1,200 for cable subscribers.)

Beatrice Liu estimates \$400 per subscriber to install for wireless cable (versus \$1100 per subscriber to build conventional cable or \$2,000 per subscriber if acquiring a conventional cable system.)

Construction costs for a 25 channel system -
head end - \$2 million to \$3 million
per home costs of \$150 for the antenna
\$150 for the converter
\$150 for installation and marketing

The breakeven point is estimated to be 1,500 to 2,000 subscribers. A system will be profitable if it targets 8% to 10% of the subscribers of an existing cable market and reaches 2%.

D. Critical Factors for Success

In order to own, construct and operate a system with any success, a wireless cable licensee must be able to:

1. Obtain access to quality programming such as HBO, Showtime, sporting events, etc.
2. Identify a viable market with limited physical constraints where subscribers are not served or poorly served by cable, and determine via the FCC whether the MMDS channels are available.
3. Obtain financing. According to the WCA, there is little financing available from venture capital sources, banks are shy about a new technology use, and few loans have been made by the government. The majority of existing systems are equity financed.

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MBE Opportunities

4. Obtain channels and negotiate leasing channels for the long term. The FCC has been slow in processing licensing applications and channel requests. It can take months to get assignment but they are attempting to change this situation.

IV. OPPORTUNITIES FOR MBEs

MBE owners can construct and operate wireless cable systems with appropriate financial backing, or invest in them. William Parrott, owner of Private Networks Inc., has an interest in several city systems and is 100% owner of a system in Houston, Texas. Communications-Link, Inc. out of Houston, Texas offers an electronic bulletin board system that provides prospective wireless cable operators (and investors) with information on the industry, wireless technology, regulatory developments, and names of vendors, operators, licensees, engineers, consultants, attorneys and associations. It also provides access to FCC information as to what channels are available by location.

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MBE Opportunities

MARKET SEGMENT ANALYSIS

ONLINE SERVICES

I. MARKET DEFINITION

Online services send information from computers over telephone lines, satellites or other broadcast media to subscribers' terminals, teleprinters, or personal computers. Online services provide either real-time information or archival information for research purposes (databases). Real-time information includes urgent information such as stock quotes, news wires, weather, race tracks, and air/rail travel. End-users are the primary customer base.

Companies that provide online services are called online vendors. Information providers or content providers supply the online vendors with databases of information. Many online vendors also develop and provide their own information databases.

Database information of most importance to businesses can be categorized into categories such as financial, credit, legal and regulatory, medical, scientific and technical, marketing, and news. In the past, "third parties" such as librarians and information centers were the primary customers for this information. However, as online services become easier to access, individual end-users are becoming a larger customer segment.

Online services most interesting to the average consumer include electronic telephone directories; air, train, bus and event ticketing; home banking; food and merchandise shopping; and brokerage. Other areas of lesser interest are games, electronic dating and chatting.

II. MARKET ENVIRONMENT

A. Current Status of Market

Revenues for online services were about \$7.2 billion in 1990. Companies providing financial and credit information services have the largest share of the market, with airline information having the second largest share.

Approximately 4,000 databases are available worldwide, with 56% (2,240) produced in the US. In 1990, there were 1.9 million home subscribers to fee-based systems.

Telecommunications Study:
MBE Opportunities

B. Sizing

Revenues for online databases are expected to grow at a 23% compound annual growth rate to about \$13.6 billion in 1994, primarily in the credit, stock quotation, financial, news, medical and legal categories. The consumer market is closely tied to the proliferation of home computers. Estimates are that by 1992, there will be an installed base of 33,040,000 computers in the 96,900,000 households in the U.S.

C. Constraints

There are few significant legislative, regulatory, or standards-related constraints on entering the online services market except for the restrictions placed on the Regional Bell Operating companies (RBOCs) and those related to credit reporting, fraud, privacy and computer security. Essentially, the RBOCs may act as online vendors of information services through gateways, but may not create or manipulate the information provided. Thus, they only provide the conduit between a users computer and the information databases.

D. Geography/International Issues

Approximately 30% of the industry revenues are from overseas. U.S. firms are becoming more competitive by translating information into foreign languages and setting up offices in other countries.

E. Players

1. Consumer-Oriented Online Services

- GENie (General Electric Network for Information Exchange), 210,000 subscribers
- CompuServe (H&R Block), 625,000 subscribers
- Prodigy (IBM & Sears), 465,000 subscribers
- Delphi
- PC-Link (Quantum Computer Services)

2. Business-Oriented Online Services

Nearly 50% of the database market has been captured by Dow Jones & Co., Equifax Inc., Mead Data Systems, Quotron